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Madagascar and New Zealand are of older separation, the latter approaching the *restinseln*.

The term 'oceanic' is discarded for the second group, because islands may be formed *de novo* close to continental shores; but the term proposed ('original') is not altogether satisfactory, as it does not express precisely what is meant. The first subdivision (volcanic islands) contains the most important examples, which have sometimes, from their considerable age and altitude, acquired peculiar and local organic forms. The second subdivision (heaped-up islands) includes those of coral and of sand, on which the dry surface is due to wave and wind action. These are all low and monotonous. The third subdivision includes portions of the sea-bottom laid bare by non-volcanic action, either by local elevation "or by withdrawal of the sea formerly held at a higher level by the local attraction of mountains or ice masses that have now disappeared." A single example of recent formation is given, — the so-called 'Gulf-stream island,' northwest of Novaya Zemlya, where the Dutch navigators of 1594 found a sand-bank in seventeen fathoms of water. Peschel's error of placing the Japanese and Philippine islands among the volcanic is corrected: they are included among the continental, as both contain a series of old non-volcanic rocks.

W. M. DAVIS.

LETTERS TO THE EDITOR.

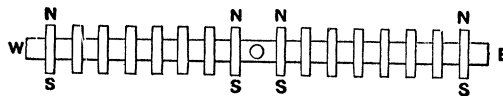
### A new form of battery-cell.

In the ordinary voltaic element, two solid plates are acted upon unequally by one or more liquids. About three years ago, it occurred to me to construct a battery-cell with three non-miscible liquid strata, and no solid plates; which I did, as follows: in a small beaker-glass I placed successively layers of mercury, dilute sulphuric acid, and a solution of iodine in ether. Upon connecting the uppermost and lowest layers with insulated wires, and introducing a coarse galvanometer into the circuit, I obtained evidence of a fairly strong current of electricity. Having neither time nor opportunity to pursue the matter further, I put it on record now in order that any student who happens to be interested in the subject may carry out the investigation. Theoretically, a three-liquid cell is interesting, because its internal resistance ought to diminish with rise of temperature. In this respect it might be very different from the usual voltaic elements. Possibly a combination of solid plates with the upper and lower liquids might give a cell having an internal resistance constant for varying temperatures. F. W. CLARKE.

### Correcting compass deviation.

Some years ago, frequently recurrent shipwrecks from magnetic disturbance in the Gulf of St. Lawrence directed my attention to the subject of improving the mariner's compass, or supplementing it in some way which would make its indications trustworthy. The causes of the shipwrecks which I have mentioned seemed to be deposits of iron ore near the shore, so extensive in their area as to render the compass-reading false and misleading. The problem of improving the compass is an important one; for, apart from such risks as those which beset navigation in the Gulf of St. Lawrence, the deviation on board ship due to the presence of iron in the structure or cargo of the vessel is an element of some uncertainty, and danger even, when all the devices known to the mariner's art are used to correct the readings.

My first attempt was to so dispose a series of small flat magnets, fastened across a strip of aluminum, that the strip as such, when poised at its centre, pointed east and west.



Poised concentrically with the strip at such a distance as to avoid mutual influence, I placed a light magnetic needle of a length equal to that of the strip. When strip and needle were near enough to a piece of iron to be attracted by it, one of the two acute angles formed by them indicated the position of the disturbing iron; and this inclination at an acute angle promised to be of value in solving the problem of correcting compass-readings. But magnetic influence on the large scale which prevails on shipboard proceeds from distant centres along large curves, in which terrestrial and local forces merge, which are not attractive, but simply directive; so that when I tried my device on a steamer under very favorable experimental circumstances, as the magnets, large and small, were directed into curves so great as to be practically straight lines, the needle and strip were always at right angles with each other. Were it feasible to use a very long magnetic strip at sea, my device might be available; but, so long as ships roll and pitch on the ocean's unruly surface, the dimensions of the ordinary compass must remain as they are. Since abandoning the fragile little model which I launched with some expectations long ago, I have frequently reverted to the problem it was intended to solve; and it has occurred to me, that were an electro-magnet poised so as to be in constant and free communication with a battery, and were it possible to make it, when desired, so intense in its power that its induction affecting the iron of ship or cargo should increase the deviation which, when less intensely excited, would affect it, then the direction of the deviation would be, of course, known by the direction of the increase of that deviation, and the problem of correcting the compass-reading would be advanced a step. The intensity of the electro-magnet would yield such results as a long (impractically long) magnetic strip. The electro-magnet would require to be so constructed as to be capable of developing the utmost intensity possible; and the current sent through it should be controllable at will, so that the indications at moderate and highest intensity might be compared. I have neither the skill nor opportunity to carry out the suggestion here given, and publish it in the hope that some competent man of science may be able to embody it in a practical and useful form.

GEORGE ILES.

Montreal, May 25, 1883.

## MAINE'S EARLY LAW AND CUSTOM.

*Dissertations on early law and custom.* By Sir HENRY SUMNER MAINE, K.C.S.I., LL.D., F.R.S. New York, *Henry Holt & Co.*, 1882. 402 p. 8°.

WHEN a new book by Sir Henry Maine is announced, we expect to have something to read worth reading. Nor have we ever been disappointed. The author of 'Ancient law' has always something interesting, suggestive,